

Datura seed intoxication in two horses

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ABSTRACT

A sunflower-based feed supplement grossly contaminated with the seed of a *Datura* sp. resulted in severe signs of poisoning in 2 horses. One horse died peracutely of acute gastric dilatation and rupture following ingestion of the contaminated feed. The 2nd horse developed unresponsive paralytic ileus that led to euthanasia. Examination of the feed and gastrointestinal contents of both horses showed a high proportion of the characteristic *Datura* sp. seeds. The clinical signs and pathology in both cases were consistent with intoxication by the parasympatholytic alkaloid components of *Datura* sp.

Key words: *Datura* sp., gastric rupture, horse, ileus, parasympatholytic, poisoning.

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INTRODUCTION

Intoxication following ingestion of the seeds and other components of the plants *Datura stramonium* and *D. ferox* have been described in man, cattle, sheep, pigs, elephant and the horse^{1,3,5,9}. *Datura* spp. are variously referred to as thorn apple, jimson weed, moon flower, stinkblaar and olieboom^{1,3,4,5,9}. The hard, spiny seed pods of *Datura* spp. contain typical small (3 mm long), dark brown, kidney-shaped seeds that have numerous small surface indentations⁵. The toxic principles in *Datura* spp. are the alkaloids atropine, hyoscine and hyoscyamine^{5,9}. These anticholinergic substances have a predominantly antimuscarinic effect via competitive inhibition of acetylcholine binding, resulting in a blockade of the autonomic impulses at the level of the neuroeffector junctions^{2,5}.

In South Africa, the small *Datura* spp. seeds often occur as contaminants of harvested maize and sunflower seeds. Mechanical harvesters break the hard seed pods, thereby releasing the seeds. These seeds are small and evade the screening mechanisms to contaminate the grain (or sunflower seed) or the chaff portion of the harvest. The chaff portion

is also occasionally used for livestock feed. Despite this, there are very few reported incidents of livestock intoxication with *Datura* seeds in South Africa. This report documents clinical, pathological and toxicological features of *Datura* seed poisoning in 2 horses in South Africa.

CASE HISTORY

An ambulatory clinic visit was made in response to a call for assistance with 2 horses apparently displaying severe colic signs. On arrival, a dead stallion with severe abdominal distension was found. The disturbed area immediately adjacent to the carcass, together with the extensive abrasions to the head and body of the horse, were consistent with severe colic. The owners had first noticed the stallion *in extremis* some 8 hours post-feeding. The horses had been fed the previous evening on a new feed supplement principally composed of sunflower seed. This feed had been obtained from the chaff portion of a sunflower seed harvest. Inspection of the feed showed it to consist of sunflower seeds with a considerable proportion (at least 25 % by volume) of *Datura* sp. seeds (Fig. 1).

The 2nd horse, a mare, which was showing signs of severe bloat and depressed habitus, was examined. Clinically the severely depressed mare showed dry oral mucosae, and bilateral mydriasis. The heart rate was 38 beats/min and the respiratory rate was 30 breaths/min with a marked costal effort. Auscultation of the abdomen failed to reveal the presence of

borborygmi. A rectal examination demonstrated an impacted distal colon. Faecal balls were dry with a mucoid coating. Naso-gastric intubation of the mare yielded a considerable reflux of fluid containing ingesta. The ingesta consisted of partially digested sunflower seed and a high proportion of small black seeds, presumptively identified as *Datura* sp. Several large strongyles and an ascarid species were also obtained. A diagnosis of paralytic ileus was made. Abdominocentesis was difficult as a result of the dilated gut but eventually a pale yellow transudate was collected. There were no leukocytes, microorganisms or ingesta present on cytological examination of the fluid. Haematological values were within normal limits.

The mare was treated by the refluxing of the gastric contents and serial lavage with a large volume of water (approximately 40 l). The bloating was relieved by trocharisation of the caecum. Flunixin meglumine (Finadyne, Centaur) was administered intravenously (10 ml) and procaine penicillin (Depocillin, Intervet) by intramuscular injection (20 ml). The mare was re-examined the following day and little improvement in the habitus was noted. The pupils were, however, of normal size, and the oral mucosae normally hydrated. The heart rate was greatly elevated (70 beats/min) and the respiratory rate was 28 breaths/min. Abdominal auscultation again failed to detect borborygmi. Rectal examination demonstrated gas-filled intrapelvic loops and an impacted distal colon. Naso-gastric intubation once again produced a significant reflux of viscous yellow fluid, consistent with small intestinal contents. The gastric lavage, Depocillin and Finadyne treatment were repeated. Owing to the ongoing ileus the mare was admitted to hospital for further observation and treatment. On Day 3, the mare's habitus remained depressed and the bloating, ileus, naso-gastric reflux and tachycardia were still present. Treatment consisted of indwelling naso-gastric intubation and ongoing serial lavage, intravenous crystalloid fluids (Sabax Ringer-Lactate, Adcock Ingram Critical Care) at 5 l/h and Finadyne and

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Depocillin. Cisapride (Prepulsid, Janssen) was empirically administered per rectum in an attempt to stimulate gastrointestinal motility. The mare did not respond and was euthanased.

On admission of the mare to the hospital, blood samples were submitted for complete blood count and selected serum chemical analyses. There was mild neutrophilia with minimal regenerative left shift, consistent with inflammation. The serum enzyme activities of creatine kinase, aspartate transaminase and lactate dehydrogenase were slightly elevated. These changes were attributed to venipuncture and other intramuscular treatments given to the horse. There was hyperproteinaemia as a result of hyperglobulinaemia. Plasma protein electrophoresis revealed elevated alpha and beta globulins, many of which are acute-phase reactants that usually increase during an acute inflammatory process. Pre-renal azotaemia ascribed to dehydration was diagnosed.

The stallion was severely bloated, with diffuse abrasions of the head and flanks. On opening the abdomen, gastric rupture involving the greater curvature of the stomach with spillage of gastric contents into the omentum and peritoneal cavity was observed (Fig. 2). The intestinal loops were filled with gas and ingesta. The gastrointestinal content comprised maize, sunflower seeds, roughage and a high proportion of small, dark-brown, kidney-shaped seeds, recognised as *Datura* sp. There was multifocal to confluent pulmonary haemorrhage with free blood present in the trachea. Rectal oedema and prolapse and preputial oedema were observed.

The most prominent lesion in the mare was severe intestinal ileus with colonic impaction. There was moderate gastric bloat with a large (3 cm diameter) serosal tear along the greater curvature (Fig. 3). *Datura* sp. seeds were present within the fluid content of the anterior gastrointestinal tract and the impacted colon (Fig.4). There was mild multifocal pulmonary atelectasis. The right portion of the liver was atrophied. Histopathological examination revealed portal fibrosis, bile duct hyperplasia and diffuse hepatocellular atrophy. No other remarkable histopathological lesions were seen.

DISCUSSION

Previous reports of *Datura* sp. intoxication in horses describe a subacute to chronic course of intoxication before the onset of clinical signs and there was variable incidence of mortality in the affected horses¹⁹. A retrospective



Fig. 1: Feed sample containing sunflower and maize seeds with gross *Datura* sp. seed contamination.

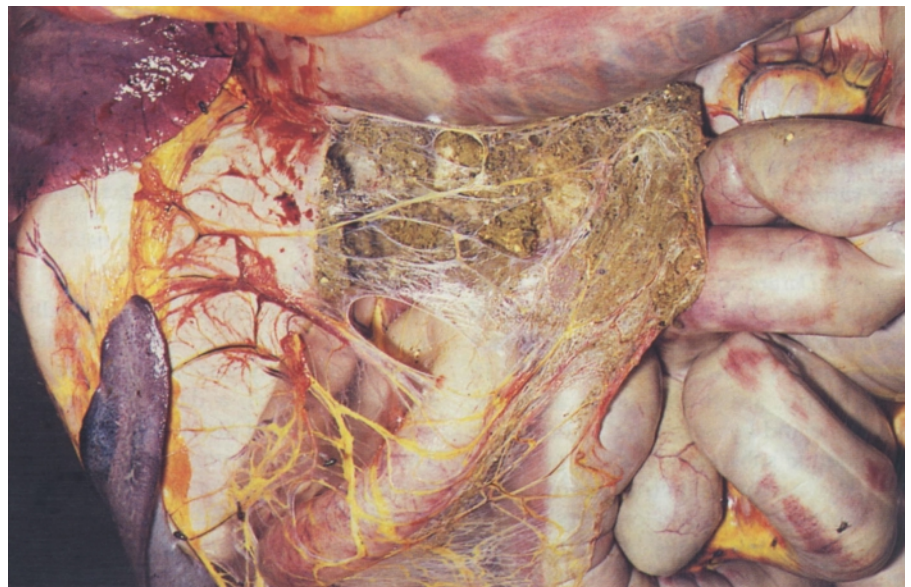


Fig. 2: Abdominal wall of the stallion reflected to show gastric rupture involving the greater curvature, with spillage of gastric content into the omentum.

evaluation of one case stated that a toxic dose of *D. stramonium* to horses was 75 mg seed per kg of feed over a period of 10 days⁹. Kellerman *et al.* report that horses were affected by 3–5 mg/kg atropine per os and sheep by 50 mg/kg, while pigs and cattle were mildly affected by 5 mg/kg⁵. Poisoning is due to anticholinergic activity of the various parasympatholytic alkaloids contained in the seeds.

In man, the reduction of gastrointestinal muscle tone and gastric secretions are well recognised pharmacological effects of atropine. Central nervous system

effects predominate, and gastrointestinal side-effects are rare². This rarity reflects a relative insensitivity of gastromotive choline receptors to atropine inhibition². Supraphysiological atropine levels are required to affect the intestinal myogenic activity of horses *in vitro*⁶. The jejunum of the horse is known to be influenced by altered pharmacological and pathological levels of adrenergic and cholinergic mediators⁶. There is a known, albeit inconsistent decrease in the amplitude of contractions of both the circular and longitudinal smooth muscle layers of the

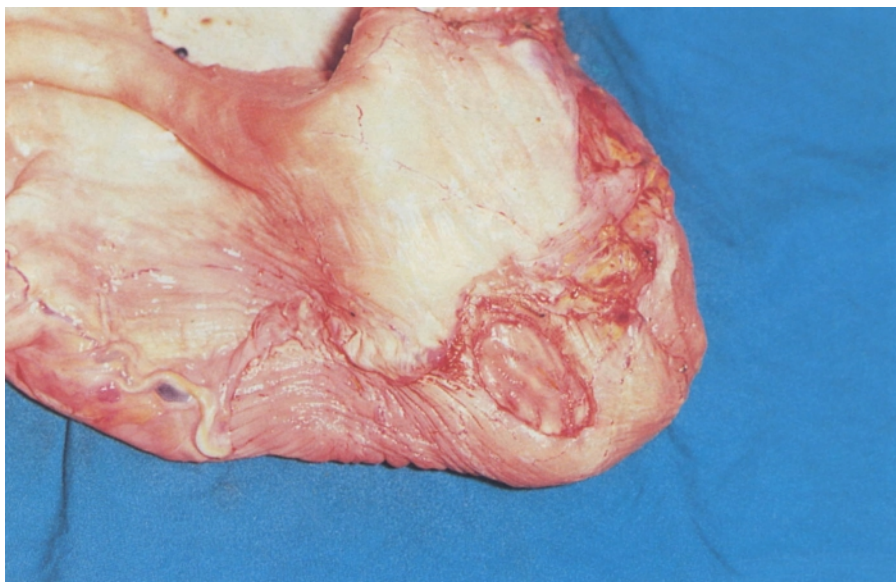


Fig. 3: The stomach of the mare showing a large serosal defect (tear) at the greater curvature.



Fig. 4: The gastrointestinal content of the mare containing scattered small, dark *Datura* sp. seeds.

jejunum in response to atropine⁶. Prolonged intestinal transit time was induced experimentally in ponies by administering doses of 0.125 mg/kg body weight of atropine⁷.

In the present report, the massive feed contamination with approximately 25 % by volume of *Datura* sp. seeds appeared to be sufficient to induce peracute signs of intoxication. In the stallion, intoxication resulted in peracute death as a result of gastric dilatation and rupture. Gastric rupture is invariably fatal and is preceded by gastric dilatation. This dilatation is

classified as primary, secondary or idiopathic. Secondary dilatation is due to distal obstruction of gastric outflow, reported causes of which include ileus and physical intestinal obstruction^{4,8}. The duration of clinical signs preceding gastric rupture reportedly vary from less than 1 h to as long as 24 days⁸. In this stallion, gastric rupture occurred peracutely as a sequel to secondary dilatation caused by *Datura*-induced ileus. Increased intra-abdominal pressure had resulted in respiratory distress and impaired abdominal lymphatic and venous drainage. This was

confirmed by the necropsy findings of pulmonary haemorrhage, rectal prolapse, rectal oedema as well as preputial oedema⁴.

In the mare, the clinical signs were mydriasis, tachycardia, hyperpnoea, decreased salivation and ileus. These signs are all consistent with a cholinergic blockade. Mydriasis appeared to resolve rapidly, but the gastrointestinal signs persisted. The elevated heart and respiratory rates may have been due to primary toxic effects or secondary to the gastrointestinal ileus which ultimately led to the mare being euthanased. At necropsy, the diagnosis of paralytic ileus was confirmed and *Datura* sp. seeds were found throughout the gastrointestinal tract. Pulmonary atelectasis was associated with increased intra-abdominal pressure resulting from gastric bloat. The hepatic pathology is associated with chronic toxicities or helminth migrations⁴, and was not associated with the acute *Datura* sp. intoxication.

It is of particular interest that in both cases the physical integrity of the gastric greater curvature was compromised (to the extent of rupture in the stallion). The occurrence of gastric rupture and paralytic ileus as a sequel to *Datura* sp. poisoning in the horse has obvious clinical and prognostic implications.

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